



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/627,460	07/25/2003	Frederick E. Koch	20030077-US	3261
42716	7590	12/21/2004	EXAMINER	
MAINE & ASMUS P. O. BOX 3445 NASHUA, NH 03061			POLYZOS, FAYE S	
			ART UNIT	PAPER NUMBER
			2878	

DATE MAILED: 12/21/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/627,460	KOCH ET AL.	
	Examiner	Art Unit	
	Faye Polyzos	2878	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 and 9-19 is/are rejected.
- 7) ☒ Claim(s) 8 and 20 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>2/17/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-7 and 14-19 are rejected under 35 U.S.C. 102(b) as being anticipated by *Fafard et al* (US 6,239,449 B1).

Regarding claim 1, *Fafard et al* discloses (Fig. 1) a quantum dot infrared photodetector for generating infrared images, the device comprising a first contact layer (6) having a metal contact (8) on its surface, a first barrier layer (12) on the surface of the first contact layer having the metal contact, a doped quantum layer (14), the doped quantum dot layer configured with a plurality of quantum dots, each dot having a size that is sensitive to a first color (col. 4, lines 59-67), a second barrier layer (26) on the doped quantum dot layer (25), a second contact layer, with a metal contact on its surface, on the second barrier layer (26) and a read-out circuit (34) electrically coupled to each of the metal contacts and adapted to correlate electrical signals produced by the doped quantum dot layer to intensity of sensed light, thereby allowing for the generation of infrared images (See Generally Fig. 1, col. 1, lines 42-55, col. 4, lines 59-67 and col. 5, lines 1-9).

Regarding claims 2 and 3, *Fafard* discloses the first contact layer is arranged on an etch stop layer, which is on a substrate (col. 5, lines 48-56).

Regarding claim 4, *Fafard* discloses the first barrier layer, the doped quantum dot layer, and the second barrier layer are repeated a number of times prior to adding the second contact layer (See generally Fig. 1 and col. 5, lines 1-7).

Regarding claims 5 and 6, *Fafard* discloses the layers of the device are formed on a substrate that is subsequently removed to enable improved imaging capability and the metal contacts are adapted to a common planar surface, thereby enabling bump-bonding to the read-out circuit (34) (See generally Fig. 1, col. 4, lines 60-67 and col. 5, lines 55-56).

Regarding claim 7, *Fafard* discloses the device is fabricated using epi-growth processing and bump-bonding (col. 5, lines 57-64).

Regarding claim 14, *Fafard et al* discloses (Fig. 1) a method of manufacturing a quantum dot infrared photodetector for generating infrared images, the device comprising growing a first contact layer (6) having a metal contact (8) on its surface, growing a first barrier layer (12) on the surface of the first contact layer having the metal contact, growing a doped quantum layer (14), the doped quantum dot layer configured with a plurality of quantum dots, each dot having a size that is sensitive to a first color (col. 4, lines 59-67), growing a second barrier layer (26) on the doped quantum dot layer (25), growing a second contact layer, with a metal contact on its surface, on the second barrier layer (26) and bonding a read-out circuit (34) electrically coupled to each of the metal contacts and adapted to correlate electrical signals produced by the doped quantum dot layer to intensity of sensed light, thereby allowing for the generation of

infrared images (See Generally Fig. 1, col. 1, lines 42-55, col. 4, lines 59-67 and col. 5, lines 1-9).

Regarding claims 15 and 16, *Fafard* discloses growing an etch stop layer on the substrate wherein the first contact layer is grown on the etch stop layer after the bonding the grown substrate to the read-out circuit (col. 5, lines 48-56).

Regarding claim 17, *Fafard* discloses repeating the growing of the first barrier layer, the doped quantum dot layer, and the second barrier layer a number of times prior to growing the second contact layer (See Generally Fig. 1, col. 5, lines 1-9).

Regarding claims 18 and 19, *Fafard* discloses the layers of the device are grown on the substrate and adapting metal contacts of the contact layer to a common planar surface (See Generally Fig. 1).

3. Claims 9-10 and 12-13 are rejected under 35 U.S.C. 102(b) as being anticipated by *Masalkar et al* (US 6445000 B1).

Regarding claims 9 and 10, *Masalkar et al* discloses a device comprises a first and second stack of quantum dot epi growths which are sensitive to a color where the first stack being sensitive to a first color and the second stack being sensitive to a second color and a read-out of each quantum dot epi growth allowing for the generation of infrared images (See generally Fig. 1 and col. 1, lines 44-53 and col. 8, lines 49-63).

Regarding claim 12, *Masalkar* discloses the device comprising additional quantum dot epi growths, with each additional quantum dot adapted to sense a unique color and to provide its output to the read-out circuit (col. 7, lines 7-24).

Regarding claim 13, *Masalkar* discloses the first quantum dot epi growth is positively biased with respect to the array common and the second quantum dot epi growth is negatively biased with respect to the array common (See Generally Fig. 9).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Masalkar et al* (US 6445000 B1) as applied to claim 9 above, and further in view of *Fafard et al* (US 6,239,449 B1).

Regarding claim 11, *Fafard* discloses the first and second quantum dot epi growths are part of a structure formed separately from the read-out circuit, wherein the structure is bump-bonded to the read-out circuit (See Generally Fig. 1).

Allowable Subject Matter

6. Claims 8 and 20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Regarding claims 8 and 20, the prior art, does not disclose or fairly suggest a method or apparatus comprising a third contact layer, a third barrier layer grown on the contact layer, a second doped quantum dot layer grown on the third barrier layer, or a

Art Unit: 2878

fourth barrier layer grown between the second doped quantum dot layer and the second surface of the first contact layer.

Conclusion


7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Faye Polyzos whose telephone number is 571-272-2447. The examiner can normally be reached on Monday thru Friday from 7:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dave Porta can be reached on 571-272-2444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

FP


DAVID PORTA
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800